LIGHTWEIGHT JOINT COMPOUND

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a joint compound for use in filling and coating the joints between adjacent gypsum wallboards, and more particularly refers to a joint compound of the type described which has a lighter weight and better sandability than conventional joint compounds thereby reducing transportation costs, facilitating the handling of containers and application tools and facilitating the final sanding and finishing of the wallboard joints.

In the construction of buildings, one of the most common elements is gypsum wallboard, often known as "drywall," used to construct the walls and/or ceilings. Walls made from gypsum wallboard are conventionally constructed by affixing the panels to studs or joints and filling and coating the joints with a specially prepared adhesive called a "joint compound." This process generally proceeds in the following fashion: a taping grade joint compound is placed within the joint formed by the abutted edges of the wallboards, and a liquid-permeable tape is embedded within the taping compound. When dry (or set), a second coating comprising a topping grade joint compound is applied over the joint. This may be sanded lightly, and then a third coat applied and conventionally finished. Another grade of joint compound is an all-purpose grade which may be used, as the name suggests, both for embedding the tape and for applying as finishing coats. In some instances, a patterned effect is given to the finished wall and joint with the all-purpose joint compound to provide a textured finish.

The primary difference in the past between the various grades of joint compound has been in the differences in the amounts of each ingredient. Thus, no matter what the grade, joint compounds invariably include a filler, and a binder. More binder is used for the taping grade than for the topping grade. Typical fillers may be calcium carbonate, calcium sulfate hemihydrate, or calcium sulfate dihydrate. As is obvious, the choice determines whether the joint compound hardens by drying or by setting. An example of a setting type joint compound is taught in U.S. Pat. No. 3,297,601.

In U.S. Pat. No. Re. 29,753 joint compounds are disclosed which are free of asbestos and utilize attapulgus clay to provide the non-leveling properties previously obtained by the use of asbestos fibers. Conventional compounds with or without attapulgus clay have proven to be excellent. However, they are quite heavy and expensive to transport. Additionally, when the conventional joint compounds dry, they have a hard texture and are difficult to sand in order to provide the joint treatment with a smooth surface. It would be desirable to have a joint compound which is of lighter weight than conventional joint compounds and which, when dry can be readily sanded to provide a smooth surface.

SUMMARY OF THE INVENTION

It is accordingly an object of the present invention to provide a joint compound which is free of asbestos.

It is a further object to provide a joint compound which has the excellent properties such as non-leveling, non-cracking and good adhesion generally required of a joint compound.

It is still further an object to provide a joint compound which is substantially lighter in weight than conventional joint compounds and may be transported at lower costs.

It is still further an object to provide a joint compound of the type described which may be readily sanded to a smooth finish after it has been dried.

It is an additional object to provide a joint compound having non-cracking and excellent adhesive properties.

Other objects and advantages of the invention will become apparent upon reference to the following description.

According to the present invention a joint compound, free of asbestos and having a lighter weight than conventional joint compounds is provided by a formulation which comprises a conventional filler such as calcium carbonate, calcium sulfate dihydrate, or calcium sulfate hemihydrate, a conventional binder such as polyvinyl acetate, a non-leveling and slip providing material such as attapulgus clay, a water retention or thickening agent such as hydroxypropyl methylcellulose, and a specially treated expanded perlite. The presence of the perlite substantially reduces the density of the joint compound and reduces the cost of transportation. Further, when mixed with water the composition provides a joint compound having excellent properties, and which, when dried, can be readily sanded to provide a smooth finish.

The first ingredient of the present lightweight joint compound is expanded and specially treated perlite. Perlite is a form of glassy rock similar to obsidian. It generally contains 65–75% SiO_2, 10–20% Al_2O_3, 2–5% H_2O, and smaller amounts of soda, potash, and lime. When perlite is heated to the softening point, it expands to form a light fluffy material similar to pumice. In preparing the perlite for use in the present invention it is first ground to a size finer than minus 200 mesh. The ground perlite is then heated to a temperature of about 1500° F. This process is carried out in a perlite expander by first heating the air to 1500° F. The finely ground perlite is then introduced into the heated air. As it is carried by the air, it is heated and pops like popcorn. Expanded perlite, is a very lightweight material. However, it contains many fine cracks and fissures, and, when placed in contact with water, the water penetrates the cracks and fissures and enters into the air filled cavities of the perlite, thereby greatly increasing the weight of the particles. Consequently, before utilizing expanded perlite in making joint compounds, it must first be treated to render it water-insensitive. This may be done in one of several different ways. The preferred method is to treat the expanded perlite with a silicone compound which seals off the cracks and fissures. The preferred silicone compound is a water-dilutable emulsion of polydimethyl siloxane. The silicone compound is applied to the expanded perlite by spraying or immersion. The silicone compound is cured at about 300° F. for a period of about 5 minutes. In plant operations, the silicone compound can be applied to the expanded perlite while it is still in the treating chamber and is still hot. The silicone compound will then cure as a result of being raised to an elevated temperature. Other means of rendering perlite water-insensitive are disclosed in U.S. Pat. No. 3,658,564 wherein perlite is rendered water-insensitive by treating the material with sodium or potassium silicate.